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(54) Vaporizers for vaporisable substances and support media for substances usable therewith

(57) A vaporizer (1) is provided with an opening (7) in a wall thereof through which vapours from a heated section of a tape (4) impregnated with one or more vaporisable substances are released, the opening (7) is covered by a hinged lid (8), the opening and closing of which actuates a switch means (12, 13) controlling the supply of current to a heating element (6) over which the tape is transported past the opening (7). The tape (4) may be moved by manual operation of knobs (10, 10') or the drive may be motorised, the tape (4) which is preferably contained in a closed cassette (14) cooperating with drive means (15, 16, 17), which may be operated intermittently or continuously. The tape (4) may be impregnated in discrete portions (5a) separated by dividers (5), the portions either all containing the same vaporisable substance or having a different substance in each portion. In another embodiment, the tape (4) may have only one substance impregnated therein, such as an insecticide. The individual portions (5a) may have separate indicia (5b) and the lid (8) may have means such as a mirror (9) by which the indicia or other tape portion identification may be viewed.

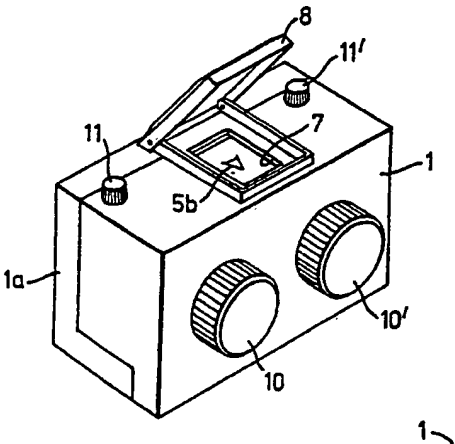

Fig.1.

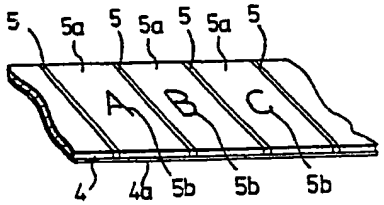

Fig.7.

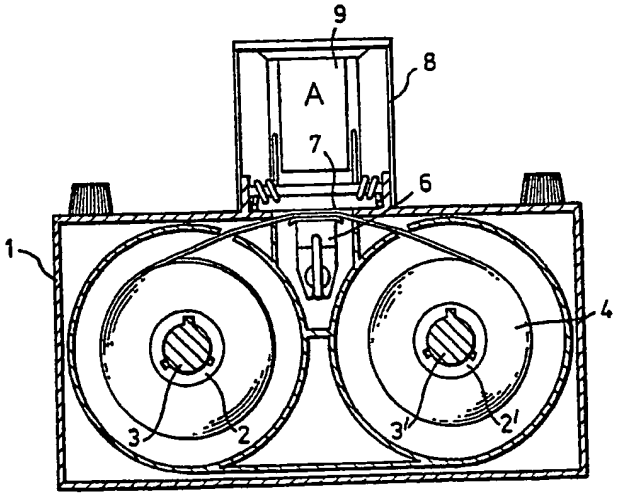

Fig.2.

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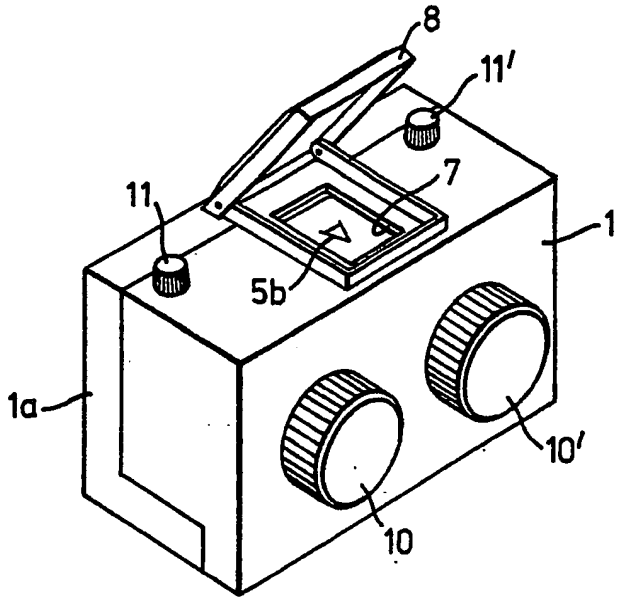


Fig.1.

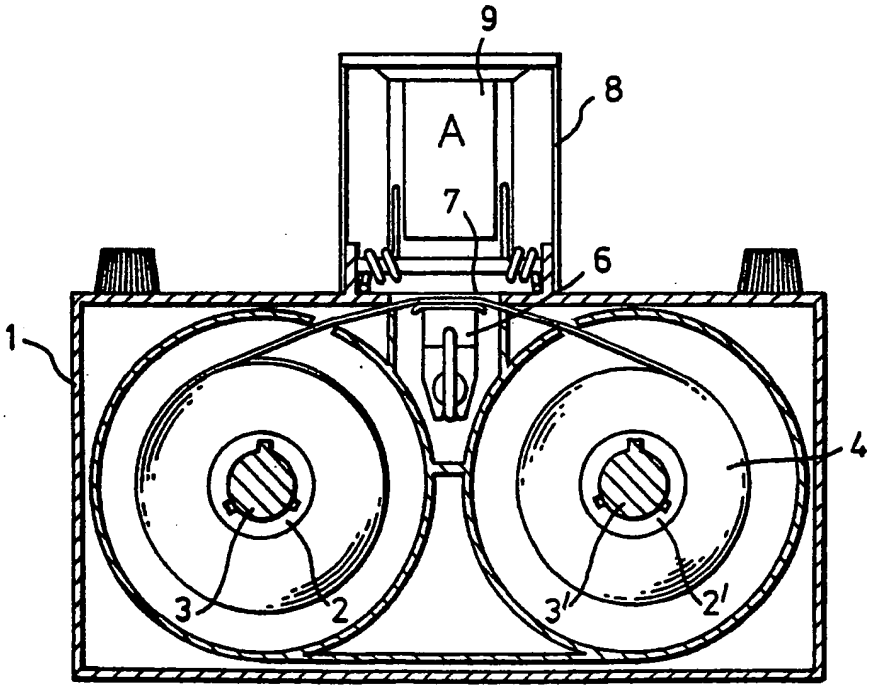


Fig.2.

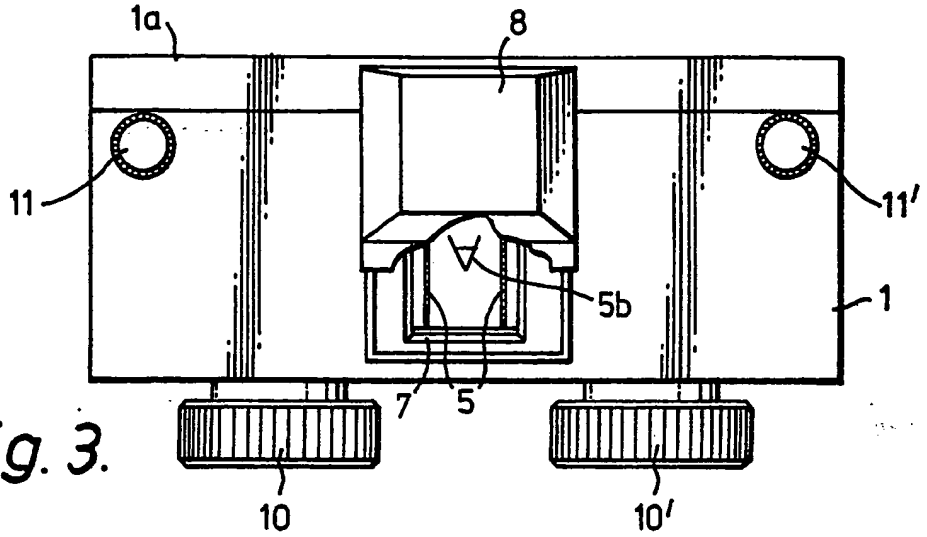


Fig. 3.

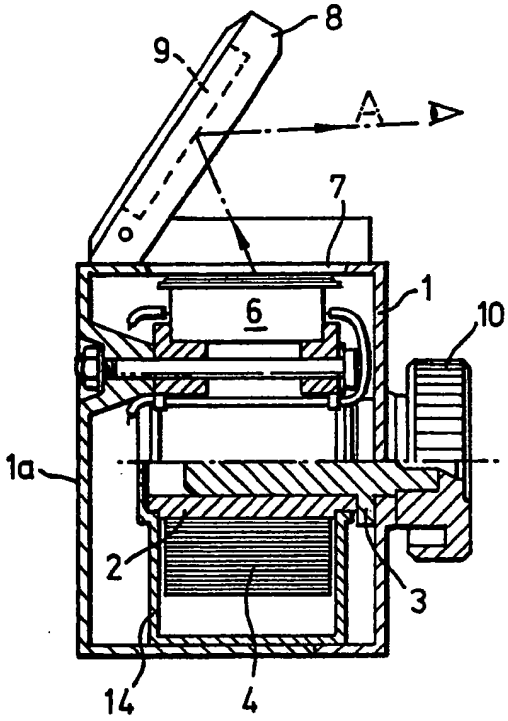


Fig. 4.

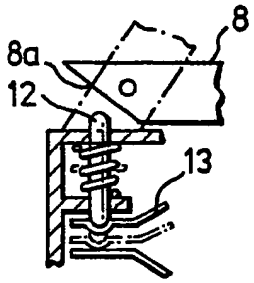


Fig. 5.

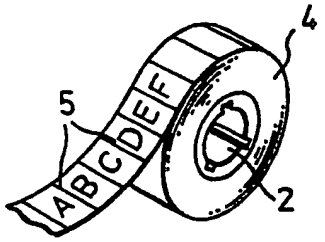


Fig. 6.

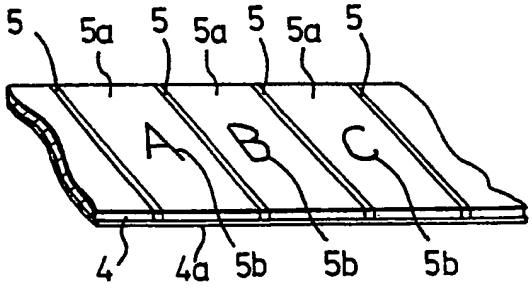


Fig. 7.

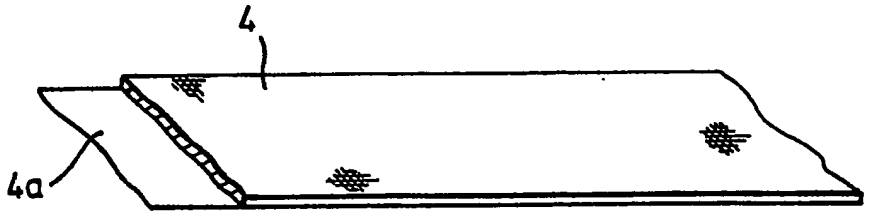


Fig.8.

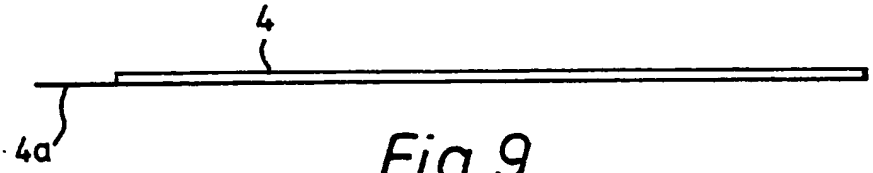


Fig.9.

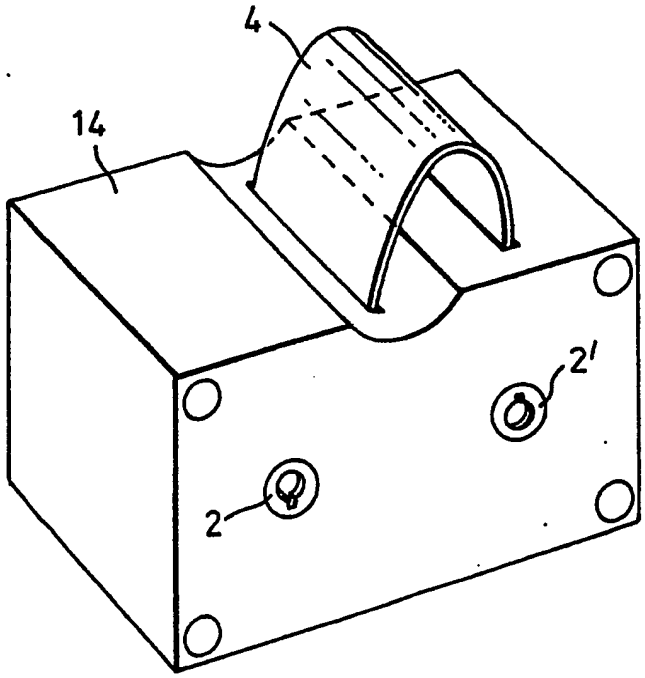
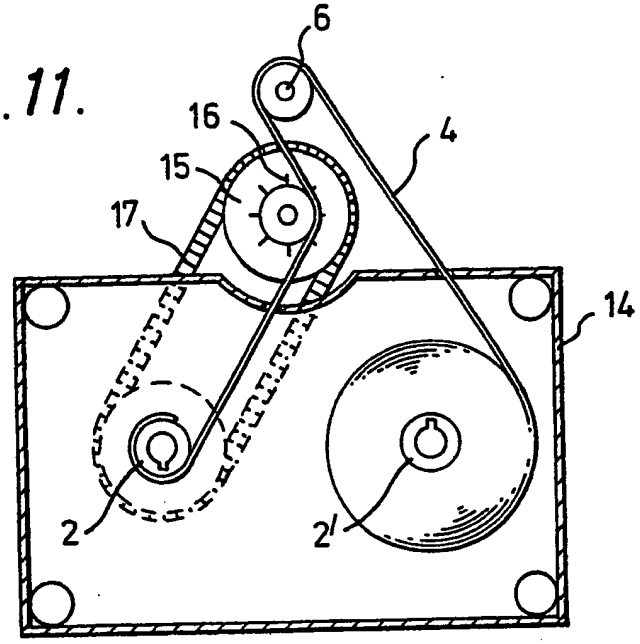


Fig.10.

Fig.11.



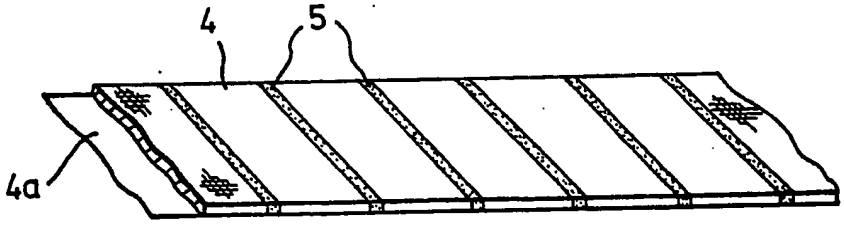


Fig.12.

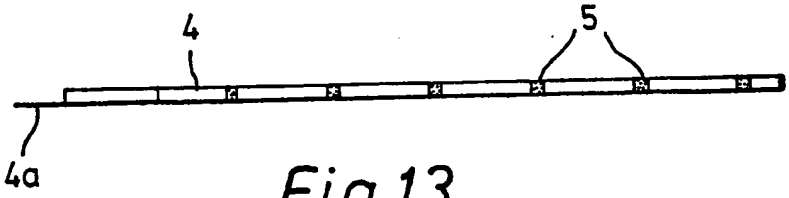


Fig.13.

SPECIFICATION

Vaporizers for vaporizable substances and support media for substances usable therewith

The present invention relates to a heating type of vaporizer for vaporizable or evaporable substances, such as aromatics, insecticides, or deodorants, which may be convenient for being used in a house, a vehicle or a campsite, and to support media for the vaporizable or evaporable substances usable therewith.

Conventionally, a container for vaporizing an aromatic or a deodorant substance which is in general use, is designed to vaporize an evaporizing agent diluted to about 10 % of concentration at an atmospheric temperature. Such a container, however, has an inevitable limit, because only one agent per container can be vaporized.

The aroma or scent is originally subject to the taste of an individual person, who shows exclusively his own response. For this reason it may be appreciated that an aroma which is pleasing to one person may conversely cause discomfort to another person, the aroma may also have such a nature that if a person is continuously exposed to the same aroma, he will tire of it or find it unpleasant. More specifically, it would be effective that in a vehicle such as a taxi in which different people may ride at different times are provided with a choice of various kinds of fragrance in a manner suiting the individual passenger's taste so that they may enjoy greater comfort. Furthermore, when making camp by means of a trailer or caravan, sometimes resulting in annoyance due to mosquitoes and other pests, it would be further advantageous, if it was possible to change a vaporized agent from an aromatic during travel to an insecticide during camping. It is still further desirable that proper use and attainment of other practical purpose in a house, a vehicle or a camping site, if possible, may be realized with only one device.

In the light of the above-mentioned existing situations, and desiderata the present invention is intended to provide a versatile type of vaporizer which can not only perform vaporization from over ten to several hundreds of kinds of manners but can also vaporize separately each of a number of aromatics, insecticides, deodorants and the like only with one device. It is another purpose of the present invention to provide an improved form of a heating type of vaporizing tape for use in continuously evaporating in turn any one of a plurality of agents.

According to the invention there is provided a vaporizer for vaporizable substances comprising two driving shafts provided in the inside of a box, which are inter-locked with external control means, an electric resistance heater element located close to a path of travel of an impregnated tape, and an opening corresponding to transverse divisions of the tape is provided on an outer face of the box, wherein the material impregnated into each of the divisions provided on the tape is identified to be vaporized through heating by means of appropriately conveying or stopping the tape with an operation of the control means.

The invention also provides a tape for such a vaporizer which comprises a film including an aluminum foil and a resin having heat resistance and impermeability to liquids applied to one face of a soft tape, made of heat resistance fabrics or porous matter, partitions, which are impermeable to liquids by an application of rubber and resin thereto, being provided in a lengthwise direction of the tape at prescribed intervals, thereby forming divisions, at least one vaporizable substance being separately impregnated into each of said divisions of the tape, applying indicia thereto so as to distinguish one from the other, the tape being wound round a roll shaft and, one end being fixed to a take-up shaft, the roll shaft and the take-up shaft being adapted to be connected with the two driving shafts.

The invention further provides a heatable tape comprising a film possessing heat resistance and impermeability to liquids laminated to one side of a soft porous tape and said tape is impregnated with the or each vaporizable substance.

Embodiments of the present invention will now be described by way of example and with reference to the accompanying drawings, in which

Fig. 1 is a perspective view of the state in which the heating type of vaporizer of the present invention performs the vaporization,

Fig. 2 is a front view of the internal mechanism with the front cover of Fig. 1 taken off,

Fig. 3 is a plan view of Fig. 1,

Fig. 4 is a side view of the vaporizer in longitudinal section,

Fig. 5 is a partial view of a switch means actuated by a lid provided on the vaporizer device,

Fig. 6 is a perspective view of one form of impregnated tape,

Fig. 7 is a partially enlarged perspective view of the tape,

Fig. 8 is a perspective view of a second embodiment of the tape,

Fig. 9 is a side view of the tape shown in Fig. 8,

Fig. 10 is a perspective view of a cassette containing an impregnated tape,

Fig. 11 is a view of the front of a vaporizer showing only the relevant parts associated with the cassette, and

Figs. 12 and 13 are perspective and side views respectively of another embodiment of the tape.

As shown particularly in Figs. 6 and 7, a film 4*a*, such as an aluminum foil and a resin having impermeability to liquids, is applied to one face of a porous tape 4, which is made of Kraft paper and having transverse partitions 5 which are treated with rubber and a synthetic resin, whereby a permeation of liquid is prevented, provided in a lengthwise direction of the tape 4 at prescribed intervals so that equal-sized divisions 5*a* are formed. After that symbols such as the letters A, B, C, D, . . . are separately indicated on each of the above divisions for example by printing or impregnation of resin, and the individual divisions 5*a* are impregnated successively with the chosen

vaporizable substances, each of which can be identified for example by coloured paints or dyes. A length of the tape 4 is then wound round a roll shaft 2, one end of the tape is fixed to a take-up shaft 2' and the roll shaft 2 and the take-up shaft 2' are adapted to be connected with driving shafts 3 and 3' in the inside of a box 1 (Fig. 1) which are interlocked with two control knobs or dials 10 and 10' mounted on the front face of the box 1. At that time the tape 4 is led close to a heating surface of an electric resistance heater element 6.

The above-mentioned heater element 6 near the upper face of the box 1 is equipped with an opening 7 at the upper position thereof, said opening being covered with a hinged lid 8. A reflex mirror 9 is mounted on the internal face of the lid 8 in a manner that when opening the lid 8, it permits one of the symbols 5*b* shown in Figs. 3, 6 and 7 provided on the divisions 5*a* of the tape 4 to be reflected in the reflex mirror 9. The reflex mirror 9 is inclined above the tape 4 located close to the upper face of the heater element 6 in the interior of the opening 7, when the lid 8 is raised, so that the front face of the box 1 gives a view of a symbol 5*b*, when operating a control knob or dial. At the same time, as shown in Fig. 5, a peripheral part 8*a* of the lid 8 pushes a rod 12 and subsequently, a contact 13 is pressed thereby so switching on the electric resistance heater element 6, the power being supplied to the heater so that it is heated and the region of the tape 4 located close to it is also heated.

Knobs 11 and 11' on the box 1 are used for loading it with the tape. In order to take off a rear cover part 1*a* of the box 1 these knobs are loosened and, thereafter, the loading is performed by means of inserting the roll shaft 2 and the take-up shaft 2' of a cassette 14 containing the roll of tape 4 onto driving shafts 3 and 3' in the inside of the box. Fig. 4 is a side view of the internal mechanism showing the tape 4 contained in the cassette 14. Needless to say, the same manner of loading may be applicable to rolls of tape which are not contained in cassettes.

Operation of the device is performed in a sequence, comprising loading the interior of the box 1 with the tape in the above-mentioned manner, connecting the device with the power source, setting up the lid 8 so as to close the switch and automatically applying the current to the heater element 6, whereby the portion of tape located close to the heater element 6 is heated, the material with which the tape is impregnated being heated and in turn vaporized through the opening 7. At that time since the front face of the box can give a view of each of the symbols 5*b* such as the letter A shown in Fig. 3 indicating the heated part of the tape which is reflected in the reflex mirror 9 mounted on the lid 8, it is possible to know immediately what is being vaporized. When selecting any material to be vaporized, the symbol 5b reflected in the reflex mirror 9 is optionally selected by means of turning the dials 10 or 10'.

In the present example the box 1 is 118 millimeters wide, 60 millimeters high and 54 millimeters deep in dimensions, containing a tape, 0.8 millimeter thick, 25 millimeters wide and 2000 millimeters long. In such a tape, 150 divisions can be provided on the tape so that when using the present device only as an evaporator, 150 patches of vaporable substances can be applied to the tape, whereas when used exclusively as an insecticidal device, 150 periods of use can be available. Furthermore, an appropriately combined use between aromatic substance and insecticide is possible. The electric power consumed by the present device is less than 2.5 W. A utilization of the power source permits the present device to be used for an automobile or domestically.

The aromatic substance and the insecticide with which the tape is impregnated can be separately identified by the arrangement in which they are individually coloured. For this reason, they are seemingly easy to distinguish one from the other, the interworking with the above-mentioned symbols makes any selection of the agent to be vaporized easier and, in addition, the division of the tape which has been vaporized is discoloured, thereby making a distinction easier. It is needless to say that differently from the foregoing embodiment representing the combined use of the symbols with the indication by colouring, any separate use of each of them may be applicable, only if it is in a position to distinguish the divisions, whenever each of them is changed to be used.

It has been apparent from the foregoing that the device of the present invention permits one device to optionally perform various kinds of vaporization without any difficulty in the house, the vehicle and the camping site and makes a comfortable atmosphere, producing the effect of eliminating harmful insects. In addition the present device is not costly.

Consideration will now be given to that part of the present invention which relates to a heating type of vaporizing tape which is used for vaporizing substances such as insecticides and aromatics by heating them.

Conventionally, a fog machine, a censer, a fumigator using an exothermic tin and a heating vaporizer using a mat impregnated with a drug, and the like are used as a device for spreading the vaporized insecticide.

Any of these conventional devices, however, has a makeshift and transitory effect; specifically, the danger involved in using an incendiary substance is enormous due to the necessity of igniting it. The fumigator, which quickly vaporizes the drug so that a room is temporarily impregnated with a high-concentration of vapor, endangers man and beast, requiring them to escape therefrom, when using it. In addition, the heating vaporizer using a mat impregnated with the drug may be said to maintain an effect for 10—12 hours, but, in effect, the vaporization of the drug successively decreases in about 6 hours so that the effect thereof is reduced.

In an attempt at solving the above-mentioned

defects, the present invention has proposed a vaporizer for efficiently and continuously vaporizing the substance with which a belt is impregnated by heating it, while controllably conveying the belt over a heater element.

A primary object of the present invention is to make the tape, which is impregnated with the chosen substance used for the above-mentioned vaporizer durable during long-term storage thereof by means of preventing the substance with which the tape is impregnated from deterioration and minimizing the amount of the drug diffused by capillarity.

Another object of the present invention is to provide a tape capable of giving rise to a plurality of aromatics by means of impregnating the tape, which is provided with divisions, sevially with different kinds of vaporizable substances.

The tape shown in Figs. 8 and 9 is for example, 38 millimeters wide and 0.6 millimeter thick and is a soft cotton tape 4 having capillarity, to which a film 4a, such as an aluminum foil, approximately 0.02 millimeter thick, is pasted on one side of the tape 4. For example, adopting Pynamin Forte (Trade Mark) produced as the insecticide by Sumitomo Chemical Co., Ltd., of Japan, in order to satisfy the requirement for eliminating insects, will impregnate said tape with 0.005 gram of Pynamin Forte (Trade Mark), which is mixed with a stabilizer and a small amount of aromatic, for each tape section, 3.7 millimeter long.

When the purpose of using the tape is only the diffusion of an aromatic substance, the substance with which the tape 4 is impregnated, is added by means of a stabilizer.

Fig. 10 shows the vaporizing tape of the present invention as incorporated into a cassette.

The tape 4 is wound around a shaft 2 fitted in the side face of the cassette 14, the free end part of the tape 4 is drawn out of one of two openings on the upper part of the cassette and, subsequently, the end thereof enters again from another opening to the inside of the cassette, being fixed around a take-up shaft 2′ fitted in the side face of the cassette.

Fig. 11 is a front view illustrating a structure of the principal part with the above-mentioned cassette 14 applied to the heating vaporizer.

The vaporizing tape 4 is drawn out of the cassette and passed over the heater 6 above the cassette and, subsequently, over a driving wheel 15 for conveying the tape at a very slow speed, such as 3.7 millimeter per min., which is equipped with needle-shaped projections 16, being slackened by means of rotating the shaft 2 and the take-up shaft 2′. The take-up shaft 2′ is adapted to be provided with a rotating force for winding up the tape, which has been vaporized under a constant tension through a spring coil belt 17 from the driving wheel 15.

When using the heating type of vaporizing tape which is impregnated with insecticide, setting a time switch for the heating vaporizer to an 8-hour running and actuating the time switch, the heating type of vaporizing tape is conveyed at a speed of 3.7 millimeter per hour so that it moves over the heater 6, the generated temperature of which is maintained at 160°C, while the film 4a, such as the aluminum foil pasted on its lower face, makes contact with the heater element 6, and it is heated, whereby the insecticide with which it is impregnated is vaporized.

Fig. 12 is a perspective view illustrating another embodiment of the tape, whereas Fig. 13 is a side view of this embodiment thereof.

This tape is adapted so as to provide the tape 4 shown in Fig. 8 and Fig. 9 with compartments by transverse separators 5 which are impregnated with rubber and synthetic resin at intervals in a lengthwise direction of the tape, thereby interrupting the capillarity. These separators 5 form a plurality of divisions in the lengthwise direction of the tape. Accordingly, if the kinds of substances with which the tape is impregnated are different for every division, each of the divisions of the tape conveyed on the heater causes the fragrance to be changed.

Therefore, once the tape of the present invention is used for an aromatic generator, a heating vaporizer, in an automobile, a room, a toilet, or whatever, since an installation of one generator entails a possibility of consecutively generating a plurality of fragrances with the lapse of time, it may not occur that one odour of one kind of aromatic, given for a long time, becomes tiring and, instead, a comfortable mental feeling arises. In addition to this, the tape can be impregnated with the insecticide or the aromatic alternately.

A coil of the tape of the present invention, the one side of which is coated with the film possessing impermeability to liquids, such as the aluminum foil, is in a state of providing the insecticide and the aromatic, with which the tape is impregnated closely, between the tape and the film, whereby the drug is neither deteriorated nor diffused due to the capillarity, as well as resulting in ability of the drug to be durable during long-term storage.

Furthermore, since the insecticide and the aromatic with which the tape is impregnated are heated through the aluminum foil on the heater without directly touching them with the heater, they do not adhere to the heater after and/or during being burnt, thereby increasing the durability of the vaporizer.

The foregoing does not limit the film which is pasted on one side of the tape to aluminum foil and permits a soft film possessing a heat resistance of about 160°C of temperature, adequate to the vaporization of the drug with which the tape is impregnated, and the impermeability to liquids (for example, synthetic resin-made film such as acetate) to be substituted for the particular film. In this connection, if a film with superior thermal conductivity, such as the aluminum foil, is used, the heat is efficiently conducted from the heater to the tape thereon, facilitating heating the tape. In addition, the film's radiant effect causes the heat to be quickly

radiated up to the tape's part further from the heater element so that the tape of the present invention produces an effect of reducing an influence of the temperature to the tape which has not yet reached the heater and from which the drug is not vaporized.

The heating type of vaporizing tape of the described invention has marked advantages compared with the conventional heating type of vaporizing device and although the above-mentioned embodiment describes the state where the tape is incorporated into a cassette, needless to say, the present tape is flexible enough to be applied in a manner of rolls of tape.

Reference should also be made to our Patent Application No. 8225225 which discloses a related form of heat-activated vaporizer for disseminating vaporizable substances such as insecticides or aromatics.

CLAIMS

1. A vaporizer for vaporizable substances comprising two driving shafts provided in the inside of a box, which are interlocked with external control means, an electric resistance heater element located close to a path of travel of an impregnated tape, and an opening corresponding to transverse divisions of the tape is provided on an outer face of the box, wherein the material impregnated into each of the divisions provided on the tape is identified to be vaporized through heating by means of appropriately conveying or stopping the tape with an operation of the control means.

2. A vaporizer according to claim 1, wherein a lid is provided for covering the opening, and a switch is interlocked with the lid a reflex mirror being mounted on the internal face of the lid in a manner that when opening the lid, the reflex mirror is inclined with respect to the tape located in the interior of the opening and the lid is adapted to close the switch for supplying the power to the heater element, the power being cut off by the closing of the lid.

3. A tape for a vaporizer according to claim 1 or claim 2 comprising a film including an aluminum foil and a resin having heat resistance and impermeability to liquids applied to one face of a soft tape, made of heat resistant fabrics or porous matter, partitions, which are impermeable to liquids by an application of rubber and resin thereto, being provided in a lengthwise direction of the tape at prescribed intervals, thereby forming divisions, at least one vaporizable substance being separately impregnated into each of said divisions of the tape, applying indicia thereto so as to distinguish one from the other, the tape being wound round a roll shaft and, one end being fixed to a take-up shaft the roll shaft and the take-up shaft being adapted to be connected with the two driving shafts.

4. A heating type of tape for at least one vaporizable substance wherein a film possessing heat resistance and impermeability to liquids is laminated to one side of a soft porous tape and said tape is impregnated with the or each vaporizable substance.

5. A tape according to claim 4 wherein the tape is impregnated with rubber or a synthetic resin at intervals in the lengthwise direction thereof and is provided with separators in the above direction, thereby interrupting the capillarity, and divisions in the tape formed by said separators are impregnated with the or each vaporizable substance.

6. A vaporizer for vaporizable substances substantially as hereinbefore described with reference to the accompanying drawings.

7. A tape for at least one vaporizable substance substantially as hereinbefore described with reference to the accompanying drawings.

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